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DIGITAL ASSIGNMENT –1

Title:- The big role of AI in the e-commerce giant Flipkart and how its implementation is helping its business boom.

1. Abstract:

AI plays a significant role in various aspects of Flipkart, one of India's largest e-commerce platforms. It helps enhance the user experience, improve operational efficiency, and enable personalized recommendations. AI algorithms are utilized to analyze data, extract insights, and automate tasks, leading to a more efficient and tailored shopping experience for customers.

“AI is the new electricity; it will change all industries. It will make a new economy worth tens of billions by 2030 or so,"

- Ravi Garikapati, CTO and head of Fintech at Flipkart

2. How has Flipkart been applying AI?

2.1. Customization to deal with consumer issues

Artificial intelligence can be employed for developing customized solutions that deal with the issues encountered by customers effectively and competently and to propel business goals. Particularly when we look at the e-commerce sector, issues like delays in delivery, dismal quality of the product, or steep pricing can lead to the product being returned or being abandoned in the cart which can result in a great degree of inconvenience and loss for an e-commerce firm like Flipkart.

Flipkart adopts artificial intelligence for the purpose of developing customized search suggestions for its customers. Since India has a wide and largely diverse section of customers, the platform has been implementing image recognition for services like recommendations, the discovery of the product, catalog search as well as product grouping.

When it comes to personalization, Flipkart is also employing machine learning to enhance the customization level of the platform

The platform’s machine learning models can suggest items on the basis of search patterns of the users, their size inclinations, earlier purchases, conversion rates, the brands they pursue, etc. This customization allows the platform to offer those products which they determine that the customers can possibly purchase.

Natural Language Processing (NLP) is adopted for Chatbots, in which the platform consistently gains knowledge through each customer interaction that takes place. It also aids the platform in averting any unnecessary or intentional negative reviews.

The primary goal is to access potential audiences across smaller cities and towns who are less familiar with the English language since a massive section of the Indian nation is familiar with only Indian languages rather than English.

2.2. Detecting issues and developing solutions

While numerous companies are now well equipped with automated systems, meticulous tasks like troubleshooting are still generally handed over to the firm's actual employees. To counter any errors made in this arena, Flipkart is one of the platforms which has been employing AI-based deep learning as well as ML models for dealing with any last-mile delivery problems, which aids the platform in saving both resources and time at the various levels of order management.

Artificial Intelligence has aided the platform in detecting and classifying addresses accurately, minimizing the duration of delivery by a minimum of 3 hours per each delivery hub. Often with the intention of availing discounts, alphanumeric characters are entered as addresses by resellers. Artificial Intelligence has played a role in identifying all such frauds relating to addresses.

2.3. Partnering with Microsoft

Back in early 2017, in an endeavor to enhance their online shopping experience, Flipkart announced partnership with Microsoft. One of the initial strides undertaken following the partnership among the two firms was Flipkart taking up Microsoft Azure to serve as its exclusive public cloud computing platform.

In the midst of an event, as confirmed by Mint in an article, Flipkart discussed its plans of employing AI, analytics capabilities as well as machine learning in Azure, like Cortana Intelligence Suite and Power BI, with the purpose of optimizing its data for innovative merchandising, customer service, marketing as well as advertising.

2.4. Project Mira

Flipkart's "Project Mira" was introduced back in 2017 as an artificial intelligence project which focused on making online shopping as personal as the experience of offline shopping. With a certain small percentage of the shipments being returned to the platform on a daily basis, the platform determined that this was caused owing to the gap existing between the expectations of the customer and the delivered item's quality. The project was developed after examining the pattern of product returns which compelled the platform to set up a tool with the goal of assisting its buyers in buying whatever they prefer.

The primary aim of the project as emphasized by the platform was to offer its customers an in-store kind of experience with a sales associate but with the duties of the associate being executed by artificial intelligence as well as via digital channels. So the users who

are on the lookout for, suppose, earphones or speakers are directed through specific inquiries, shopping notions, conversational filters as well as enticing offers and products in trend.

As reported by Economic Times in a 2017 article, if a user opens Flipkart's platform to search for say, a Bluetooth speaker. Through the courtesy of Project Mira, Flipkart can now inquire with the buyers what kind of Bluetooth speaker they wish to purchase, the brand, the size, the sound quality, and other such facilities. This is a step towards offering a hand to customers and aid them in finding the exact product that they require in online settings that cannot be easily navigated.

Similar to offline shopping in which the customer is inquired about their size as well as remaining requirements, prior to making a recommendation, Flipkart is attempting to head towards a similar approach.

2.5. AI For India

Flipkart also set up AI For India in 2017, as an endeavor to take advantage of the opportunity gained from the escalating number of users on the Internet and the rising use of smartphones among the populace in the present modern era. Through AI For India, the platform is employing artificial intelligence in a bolder manner to optimize service differentiation, enhance user experience, and for automating the back-end procedures. The platform's AI For India wing aspires to tackle artificial intelligence for enhancing customer experience and to iron out obstacles pertaining to the nation's e-retail ecosystem.

2.6. Voice Assistants

Recently in the month of June 2020, Flipkart set up the Voice Assistant feature upon its platform, for making the buying experience easier and more organic. Being set up in Flipkart's grocery store, Supermart, the Voice Assistant will allow customers to explore and purchase products in an easier manner by adopting voice commands in varied languages, be it Hindi or English.

This AI-powered, voice-first platform has been developed to be equipped with solutions for Speech Recognition, Natural Language Understanding, Machine Translation, as well as Text to Speech for Indian languages. These solutions have the capacity of absorbing

vernacular languages like Hindi, e-commerce categories and products, and tasks like locating a product, comprehending the product details, placing an order, and so forth.

The AI platform has been developed for the purpose of inadvertently detecting the language the user speaks, and then translating, transcribing, transliteration, or comprehending in real-time, the user's resolve towards having enticing shopping-related interactions in a variety of Indian languages according to the firm.

2.7. Conclusion

Over the recent span of years, Flipkart has been dominating the Indian e-commerce, its adoption of artificial intelligence playing a paramount role in its advanced services. The platform has gradually revolutionized the shopping approach of the audience by paving the way for aspects like convenience and affordability in the field of retail.

The platform consistently focuses on expansion and progress, making automation, artificial intelligence, and bots its most weapons to propel its path.

3. How Flipkart is Using Artificial Intelligence to Stay Ahead of Competition

Competition continues to heat up for online retail. Each day, new players emerge – from mass e-retailers to niche providers – all hopeful of capturing a slice of the burgeoning digital commerce market. Meanwhile, brick & mortar stores, too, are ramping up their digital presence to capture a slice of this ever-growing pie. As a result, it's a whirlwind of strategies and experiments as providers clammer for the consumer dollar.

For popular e-retailer Flipkart, artificial intelligence is the way forward. Flipkart, which recently garnered attention for selling its 77% stake to brick-and-mortar heavyweight Walmart for a steep

US$16 billion, leverages artificial intelligence to determine emotional and functional motivators that affect consumer buying behaviour.

Leveraging artificial intelligence to analyse petabytes of data can unveil profound insights on consumer tastes and preferences – a strategy which has played a crucial role in Flipkart's growth since 2007. Flipkart leverages these insights to improve its online shopping experience, including which product it offers as well as where it should focus its innovation efforts.

According to advisory firm RedSeer Consulting, Flipkart's share in the Indian e-commerce sphere stands at about 47%, ahead of its closest arch-rival Amazon India at 33%.

3.1. Ecosystem ripe for the next 100 million customers

India's Internet Economy is unsurprisingly on an upwards trajectory, ripe for e-commerce companies like Flipkart to grow. A recent joint report by IBM and Kalaari Capital forecast that the country's economy will be worth US$1 trillion by 2025, with smartphone penetration at 90% and 850 million Internet users. This is due to the falling cost of smartphones and more affordable mobile data plans.

The boost to India's Internet Economy offers immense potential to incumbent e-commerce firms. The online market is a minuscule 2.9% of the US$670 billion retail market in the country.

Technology has been pivotal in Flipkart's offering of buying experiences. In October last year, its mobile app hit 100 million downloads on the Google Play Store, the first of any e-commerce player in India to do so. Flipkart receives most of its traffic via the Android app.

Flipkart also launched AI For India last year to make the best of the lucrative business opportunity from the rising number of Internet users and higher smartphone penetration in the country. With AI For India, Flipkart is applying artificial intelligence more aggressively to build upon service differentiation, better user experience and to automate back-end processes.
The differentiating factor behind the success of an e-commerce play is if it offers something cheaper, better or faster. Flipkart's AI For India hopes to harness artificial intelligence to resolve bottlenecks that are unique to the e-retail ecosystem in India and to improve customer experience. These are some of the improvements the company is

investing in as it works towards its goal of acquiring the next 100 million customers, something the homegrown e-retailer is taking seriously in response to the rising threat of Amazon India.

3.2. The big artificial intelligence leap

Call it a gold mine, or the new oil — data is fodder for artificial intelligence. The quality and depth of the data decides the strength of artificial intelligence applications and provides desired results.

And Flipkart has no shortage of it.

The e-commerce firm has collected consumer data since 2007 from transactions on the website and app. On an average day, Flipkart's over 100 million registered users generate about 10 to 15 terabytes of data.

In-house, big data analytics infrastructure has enabled Flipkart to make its data more secure, provided flexibility in scaling operations and opened doors to testing innovation. The firm has created at least 40 insights for each of its over 100 million customers — from GPS locations and page scrolls, to preferred brands and frequency of purchase — which has helped to dissect customers' buying psyche, boost brand awareness and detect fraudulent buyers.

To support the massive turnover of data, Flipkart also develops a steady stream of analytics talents by recruiting artificial intelligence experts and collaborating with educational institutions like Stanford University and Carnegie Mellon University.

They have also partnered with tech giant Microsoft. In addition to deploying Azure, Microsoft's cloud-computing platform, Flipkart has set up the software giant's artificial intelligence and machine learning-based solutions to optimise merchandising and order placement, particularly during large-scale events. Cracking merchandising means achieving an optimum display of products on the website or app and thus increasing sales.

The e-commerce firm plans to build a multimodal search interface, including voice and image search, though this is still in its experimental stages. By 2021, Gartner predicts that brands that tap on to visual and voice search and redesign their websites accordingly will benefit from a rise in digital commerce revenue by up to 30%.

Globally, investments in artificial intelligence-run technology are expected to rise. International Data Corporation forecasts that worldwide spending on cognitive and artificial intelligence systems will jump to US$57.6 billion by 2021, up from US$12 billion in 2017.

3.3. Artificial Intelligence-delivered outcomes

3.3.1 Personalisation to address pain points

Firms can use artificial intelligence to create personalised solutions, which address customer pain points more efficiently and adequately and drive business goals. For an e-commerce firm like Flipkart, pain points like delivery delays, low product quality and high price points can trigger product returns and cart abandonment.

And these are not small issues. A report by Octane Research states that the rate of cart abandonment in India is 70 to 75%, resulting in an annual revenue loss of about $10 billion for firms.

Flipkart uses artificial intelligence to create personalised search recommendations for its users. Given that India’s customer base is vastly diverse, the firm is applying image recognition — a deep learning application — for suggestions, product discovery, product grouping and catalogue search.

Machine learning can also add another level of personalisation to a firm’s efforts. Flipkart is researching machine learning-based applications to improve product search. Their machine learning models can recommend products based on users’ search patterns, size preferences, past purchases, conversion rates, brand followed and so on. This personalisation helps deliver products that customers are more likely to buy. According to Flipkart, machine learning recommendations have already shown a 10% rise in click-through rate.

Solutions that process natural human language data can automate processes and reach different audiences. Natural Language Processing (NLP) is another application that Flipkart is leveraging to help to moderate or clean up the reviews section particularly during big sale days, flagging off deliberate negative reviews.

The eventual goal is to reach out to prospectives from smaller towns and cities who may be less proficient in English. This is especially

important for Flipkart as nine out of 10 new Internet users from India speak only an Indian language.

Another prevailing artificial intelligence solution that is popular with many firms across industries is artificial intelligence-run chatbots. Mira, Flipkart's artificial intelligence-run virtual shopping assistant, which has been on trial since its launch in 2017, learns from each customer interaction to improve the brand experience for shoppers. Flipkart's goal for Mira is to meet prospective buyers' queries, derive intelligent predictions and customisations, and tailoring enhanced online experience resulting in reduced returns.

The virtual assistant has already contributed to an improvement in buyer experience, increasing cart addition by nearly 12%.

In another initiative named Flipkart Utkarsh (which means 'excellence'), the e-commerce firm recently harnessed artificial intelligence to improve on the quality of products sold by its 100,000 registered sellers.

Flipkart's teams visited sellers' locations and identified possible gaps in their operations and the quality of the products. They also used artificial intelligence and machine learning models to derive insights from the data collected from buyers and sellers, which are then used to create guidelines to improve quality and reduce returns.

With the use of artificial intelligence and machine learning, Flipkart has successfully established a high level of personalisation in solving customers' problems, which has driven its business goals of reducing product returns and cart abandonment. While not all firms have the same amount of artificial intelligence muscle, looking into artificial intelligence-based solutions to automate personalisation and address customer pain points can push a company forward.

3.3.2. Using artificial intelligence to identify problems and generate solutions

Although many firms — not just in e-commerce — already have automated systems in place, troubleshooting is typically left to actual employees. Flipkart is applying artificial intelligence-based deep learning and Machine Learning models to resolve last-mile delivery issues, which helps to save time and resources at different stages of order management.

According to Flipkart, artificial intelligence has helped the firm classify and identify addresses with 98% accuracy, reducing delivery time by at least three hours per delivery hub. It has even aided in detecting address-related fraud committed by resellers who give random alphanumeric letters, or ‘monkey-typed addresses’ in industry jargon. Although this may be a woe more unique to India, most companies can benefit from the clarity such artificial intelligence processes provide.

All companies work towards managing delays or failures and avoiding diminishing customer satisfaction and trust. For Flipkart, which even maps the shortest and least complicated route to the customer’s doorstep, this has pushed them forward in the e-commerce scene.

3.3.3 Identifying customer pain points and solutions based on artificial intelligence-derived insights

Artificial intelligence and machine learning can also be used to glean insights into customer behaviour, to improve your product in a manner that’s much more efficient than spending man hours on surveys. For Flipkart, they derive insights from customer reviews and customer behaviour, to identify market and design differentiated products or private labels using artificial intelligence and machine learning-based models. As an e-commerce giant, this enables them to produce higher quality but affordable products.

Flipkart’s solution to generating higher quality but affordable products was self-owned labels. With autonomy over the products, this allowed the firm to directly address the pain points of consumers and become the preferred choice of a large number of buyers.

Flipkart has launched self-owned labels in fashion, furniture, consumer durables and large appliances. Billion is one of Flipkart’s brands shaped by extensive review analysis using artificial intelligence tools.

For example, Billion smartphones address significant user pain points derived from artificial intelligence, like battery life, camera quality, free unlimited data storage and so on.

Billion air-conditioners come with features that protect users from bacteria and fine particles. They also claim to be energy and cost-

efficient. More products like backpacks with more storage space, fast-charging power banks in appealing colours, extra-absorbent diapers and kitchen pans with thicker non-stick coating propelled Billion to popularity among shoppers on Flipkart.

The firm claims that returns on Billion products are 50% less compared to all other brands sold in the marketplace.

In-house brand Moda Rapido on Flipkart's (also in-house) fashion site Myntra became the first online fashion brand in the country supported by artificial intelligence. Launched in 2017, Moda Rapido offers design collections based on customer insights from the entire digital space, including Myntra's customer's data, fashion portals and social media. Using artificial intelligence, designs are created with all the design and manufacturing specifications, predicting what would sell best.

Artificial intelligence solutions have reduced design time for Myntra's innovation lab — unironically named Rapid — from six months to just one.

Artificial intelligence can predict which colours, styles and patterns will sell. As a result, Flipkart launched three labels of its own in 2017 — Metronaut for casual wear, accessories and footwear, Anmi, for contemporary women's fashion and Divastri for unstitched dress and ethnic wear.

The e-commerce player claims the information collected by the Flipkart Fashion store is exhaustive. The questions artificial intelligence can answer go as deep as "What are the demographics of a person who wears a mandarin collar?", to "What colour works for which demographic?" and even, "What fabrics see the most returns?"

The level of personalisation runs deep on Flipkart. To balance satisfactory buying experience with low mobile bandwidth is a challenge that its data team has also addressed.

On low mobile bandwidth networks, artificial intelligence-enabled algorithms narrow down product searches to a smaller number of products without sacrificing image quality, discovering more personalised products that meet the relevant aspects required by the buyer. The majority of products detected on low mobile bandwidth are from local sellers who cater to hyperlocal taste.

Machine learning applications also support sellers on Flipkart's platform. This makes it easy for shop owners to calculate demand or revenue per impression (RPI) for a product, as well as develop price discovery of a specific product.

Using artificial intelligence to tackle pain points for customers and sellers, Flipkart has automated and effectively addressed crucial needs. While not all firms have the resources for extensive artificial intelligence coverage in all areas of their business, artificial intelligence can give firms more control over how they plug the gaps in customer needs.

4. Challenges in adopting artificial intelligence-powered solutions

Most companies struggle to embrace emerging technologies, and artificial intelligence adoption is no different. In a 2017 MIT-Boston Consulting Group survey, 85% of corporate business owners believed that artificial intelligence had the potential to transform business. However, only 20% of companies had adopted it in some way, while only 5% applied artificial intelligence solutions extensively.

The lethargic adoption of artificial intelligence in most countries can be attributed to problems in coordinating different artificial intelligence solutions, lack of inadequate data due to changes in business dynamics and the high cost of artificial intelligence-based solutions.

Flipkart leads the e-commerce market in India because — with the help of artificial intelligence — they redefined the way people shop, with convenience and affordability. The retailer's acquisition by Walmart will only contribute to its financial muscle and tech capabilities.

What is unlikely to change is the firm's focus on scaling and growth — for which artificial intelligence, bots and automation are surefire weapons.

5. With AI & ML, Flipkart is addressing the uniquely Indian problem of problem addresses

Street addresses in India tell a story in themselves. Some are short, some are long, and some are detailed, and some are incomprehensible. A uniquely Indian problem, addresses pose a riddle to data scientists, and a frustrating, revenue-bleeding headache for businesses that rely on last-mile logistics. Flipkart's data scientists have developed a machine learning model that not only makes sense of complex Indian addresses but also finds application in detecting and eliminating address fraud. Read all about another #AIForIndia solution that Flipkart pioneered

5.1,Address

What's in an address? Shakespeare might have pondered his famous question differently had he been a data scientist in the age of artificial intelligence and machine learning. Especially so if he were a data scientist at Flipkart. Businesses operating in the e-commerce and last-mile logistics sectors in India may empathize with this problem statement, for inaccurate and inconsistently formatted addresses result in massive revenue setbacks every year. In an interview with Flipkart Stories published in December 2017, in which he articulated Flipkart's "AI For India" vision, Flipkart co-founder and executive chairman Sachin Bansal exhorted practitioners working in the domains of artificial intelligence, including deep learning and machine learning, to rise to the challenge of solving complex and uniquely Indian problems. Not surprisingly, among the plethora of problem statements challenging data scientists and AI-ML engineers is that posed by the complexity of addresses in India.

In a research paper titled Geographical address classification without using geolocation coordinates published in 2015 and archived at the ACM (Association for Computing Machinery) Digital Library, Dr T Ravindra Babu and other data scientists at Flipkart recognize that addressing systems in India do not yet have "an organized form where they can directly be correlated with a geolocation", positing the argument that as far as published literature goes, this is a problem unique to India.

Dr Ravindra Babu led the team of Flipkart data scientists who authored a scientific paper on solving the problem of Indian addresses with a Machine Learning (ML) model.

“In the countries where there exists a structure in addresses both in terms of definitions and the way people that follow them, the solution to the problem is relatively less challenging,” the authors write. However, they add, in countries where people do not follow the structure, owing to diversity and literacy levels, the challenge grows immensely. It was against the background of such challenges that this team of data scientists working at Flipkart developed and successfully demonstrated a working system for address classification.

The significance of their work goes beyond the realms of academia into applied business practice. By integrating novel contributions from their research — which included probabilistic separation of compound words, data-dependent machine learning-based dictionary models, and methods of detecting and eliminating fraudulent addresses — the team of Flipkart data scientists arrived at a robust working address classification system that would vastly improve the efficiency of last-mile delivery in logistics besides detecting and eliminating address-based fraudulent practices. Arguably, this AI innovation for India has far-reaching consequences.

Inside a Flipkart warehouse, consignments meant for different destinations are classified according to a system that relies on the understanding and experience of the personnel at the hub, Flipkart's ML solution tried to make sense of this classification process.

5.2. PIN codes are inadequate for Digital India

By definition, postal addresses are required to be consistent to enable correct and efficient delivery of mail or shipments, including such important parcels as passports, bank statements, utility bills, domestic gas connections, etc. In an ideal world, addresses should be structured in a hierarchical manner; i.e. by country, state, district, city/town, locality, and so on. However, postal addresses in India are neither consistent nor do they accurately convey or represent geolocation.

Locating an address in India can be a bit of an adventure in itself. In the absence of a formal geospatial classification based on latitude-longitude coordinates, postal addresses are organized by Postal Index Number, or PIN, colloquially known as pincodes or PIN codes. However, each individual PIN code may correspond to an area as large as 50 square kilometers. The PIN system, which was implemented in 1972, is inadequate to serve consumers who access services over the internet and cellular data networks.

MapMyIndia, the location-based technology solutions company in which Flipkart has invested, attempts to overcome the problems of PIN code-based addresses with a digital address system called eLoc. This is a six-character digital address that uniquely identifies any location in India based on digital parameters and deep mapping technology. MapMyIndia claims that the last-mile accuracy of this system is more precise than that offered by commonly used consumer mapping services.

5.3. One address, many voices, multiple versions

Even as technology helps close the gap, it has a long way to go before it can solve the problem of non-standard address structures. Street addresses in Lutyens' Delhi, for instance, follow a different structure compared to those in other localities of the city such as Chandni Chowk or Hauz Khas Village. Some areas of Bengaluru, for example, use labels like "blocks", "mains" and "crosses" to designate street addresses while others in the same city follow nomenclature such as "phases" and "sectors", with or without house numbers, house names or street names. When new suburbs or villages are absorbed into the ever-expanding urban meshwork, they may not necessarily adhere to traditional naming conventions.

The majority of Indian place names are translated phonetically into English from local languages. Official place names may differ from conventional names, and the resulting address may contain highly variable spelling patterns. In addition, they may include typographical errors, or clerical errors introduced by errant gazetteers.

An eKart wishmaster goes about his delivery routine. These delivery executives have a deep tacit knowledge of the addresses on their routes. Flipkart's data scientists built a machine learning model (ML) to approximate their skill.

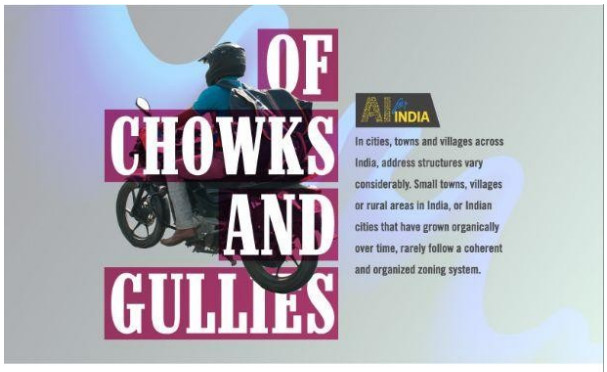
5.4. A headache for last-mile logistics

To cut a long story short, in the absence of clear and consistent naming or zoning conventions, the correct resolution of street addresses throws a considerably challenging problem before data scientists. Not to mention a frustrating headache for businesses whose competitiveness and profitability hinge on the speed and efficiency of last-mile logistics.

Consider the effect that inconsistent addresses have on e-commerce. For one, delayed delivery erodes customer satisfaction. Improper addresses cause rerouting and return of shipments, placing a high load on the logistics network, not to mention incurring a high cost on logistics, transport, customer support and complaint resolution. This additional cost is borne by the business, and it eats into profits.

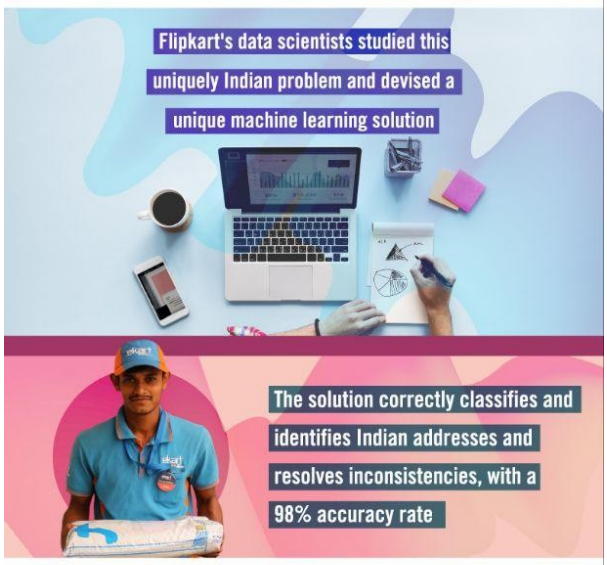
In the Flipkart context, delivery addresses are user-generated. Customers input addresses by filling in the required online forms during the user registration process on the Flipkart platform. A chief address determinant is the user's PIN code, which is captured and mapped using internal systems. However, owing to lack of clarity, customers may enter incorrect PIN codes. Or they may commit

spelling errors while filling up other form fields. In many cases, the addresses entered are incomplete, with one or more form fields missing.


OF
CHOWKS
AND
GULLIES
AI for INDIA
In cities, towns and villages across India, address structures vary considerably. Small towns, villages or rural areas in India, or Indian cities that have grown organically over time, rarely follow a coherent and organized zoning system.

Indian postal addresses are inherently complex and inconsistent, presenting a unique problem for last-mile logistics
PIN codes are official address classifiers, but they are far from accurate
Incorrect addresses lead to delayed or failed delivery of shipments

Wrong addresses also adversely impact revenue and customer satisfaction - a nightmare for e-commerce


Flipkart's data scientists studied this uniquely Indian problem and devised a unique machine learning solution
The solution correctly classifies and identifies Indian addresses and resolves inconsistencies, with a 98% accuracy rate

This innovative machine learning solution also helps detect and deter address fraud, reversing revenue setbacks
#AIForIndia

5.5. Addressing the problem with ML

To get to the heart of the matter, the Flipkart data scientists visited the company's warehouses and delivery hubs to observe how personnel at the sorting facility understood and classified addresses. They noted a deep application of tacit knowledge in the process. The sorting personnel played a role in identifying addresses intended for each Delivery Hub based on PIN code and location information. Further, the eKart wishmasters at each Delivery Hub, who are responsible for last-mile delivery of a shipment to the customer, also had a strong familiarity with the addresses on their routes.

"Machine learning had to understand how their unique knowledge could be converted into a model," says Dr Ravindra Babu, adding that at the outset the brief was rather vague. "My engineering leader only told me we needed to do something about addresses."

Here was the challenge that lay before the data scientists: Can machine learning be used to understand and make sense of these complex and highly inconsistent addresses to improve the delivery efficiency of last-mile logistics? Further, could this model be applied to detect and eliminate address fraud?

Flipkart's data scientists purported to approximate the mental model — the labels that the sorting personnel employed to classify an address correctly — and build a machine learning model that would attempt to learn incrementally from these labels and patterns to reduce the error rate.

The machine learning solution that the Flipkart data scientists and engineers built was, as Dr Ravindra says, "our own innovation to solve a very Indian problem." Working with the field executives and supervisors at the hub, the data scientists collected and validated the data sets. Then came the process of labeling the addresses.

"The way the human mind perceives these things is different from the way a machine understands data, so that was the challenge before us," says Dr Ravindra Babu. "Moreover, any machine learning model will have inaccuracies."

The challenges, Dr Ravindra adds, included identifying representative features, encoding a field executive's domain knowledge, pre-

processing stages (which themselves contained a few models at work), and the choice of an appropriate blend of supervised and unsupervised learning approaches.

Cleansing the datasets was an enormous task but the pace picked up once the machine was trained with clean data. “It took four months to build a machine learning model and, within a couple of months, the engineering solution was built,” says Dr Ravindra Babu.

A security personnel stands guard in a Flipkart warehouse

5.6. Protecting customers from address fraud

If machine learning can be implemented to play good cop, it can also play bad cop to deter fraudulent practices.

The Flipkart shopping platform is a consumer retail platform; in other words, it intends to make quality products accessible and affordable to end customers, not middlemen or resellers. In the normal course, a retail customer is limited to purchasing a certain number of high-value items (such as a mobile phone or electronic appliance) during a single shopping session in order to enable more customers to have access to these coveted products.

Such guardrails are put in place to to deter resellers and ensure that retail customers have access to quality products at affordable prices. However, some customers, who are potential resellers, exploit this

system for dishonest gains. Reseller fraud is a kind of malpractice where small business owners pose as online shoppers. They purchase articles such as mobile phones at a discount from online shopping sites and then sell them in the retail market at a profit. This is illicit, and tracking down the perpetrators of such fraudulent practices is a challenge for e-commerce businesses.

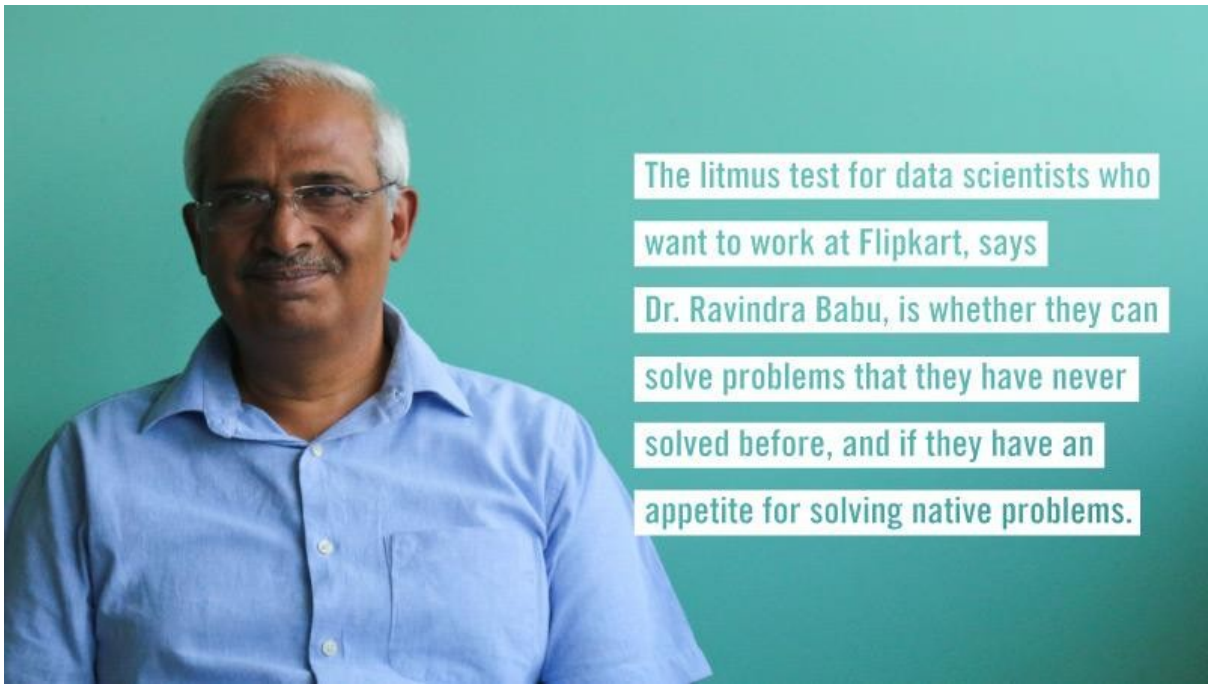
“We have a machine learning model in place to identify and blacklist resellers,” says Dr Ravindra Babu, explaining that the machine has been trained to capture the signals used to identify a reseller. Similar models, he says, have been deployed to tackle different kinds of fraud and they have helped the company plug potential revenue setbacks amounting to millions of dollars.

5.7. AI & ML problems whet the appetite of data scientists

The impact of inconsistent addresses on last-mile logistics is a problem unique to India. In the absence of standard textbook solutions, Flipkart’s data scientists rose to the occasion. Their efforts helped Flipkart to develop a solution to classify complex and inconsistent addresses with an accuracy rate of 98% (read the published paper for details), besides being able to identify signals that could detect potential address-related fraud.

So, what inspired these data scientists? Simply put, it was the novelty of the problem, and the availability of real data.

In contrast to research institutes, Flipkart provides interesting practical challenges unique to India where data scientists need to arrive at formal mathematical problem statements from broad business directions. Subsequently, they need to define the patterns and features, and develop an effective machine learning model.


The litmus test for data scientists who
want to work at Flipkart, says
Dr. Ravindra Babu, is whether they can
solve problems that they have never
solved before, and if they have an
appetite for solving native problems.

> “Are these unseen and native problems? Can I solve them from first principles?” asks Dr Ravindra Babu, noting that such questions get a data scientist’s blood up. “And that’s what makes it thrilling.”
>
> And what is the mettle of the data scientist who can live up to Flipkart’s expectations? Typically, they would hold doctorate and master’s degrees from reputed universities and would have worked deep in one field, solving problems in depth and breadth. The litmus test, says Dr Ravindra Babu, is whether they can solve problems that they have never solved before, and if they have an appetite for solving native problems. That is the opportunity that Flipkart can offer

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